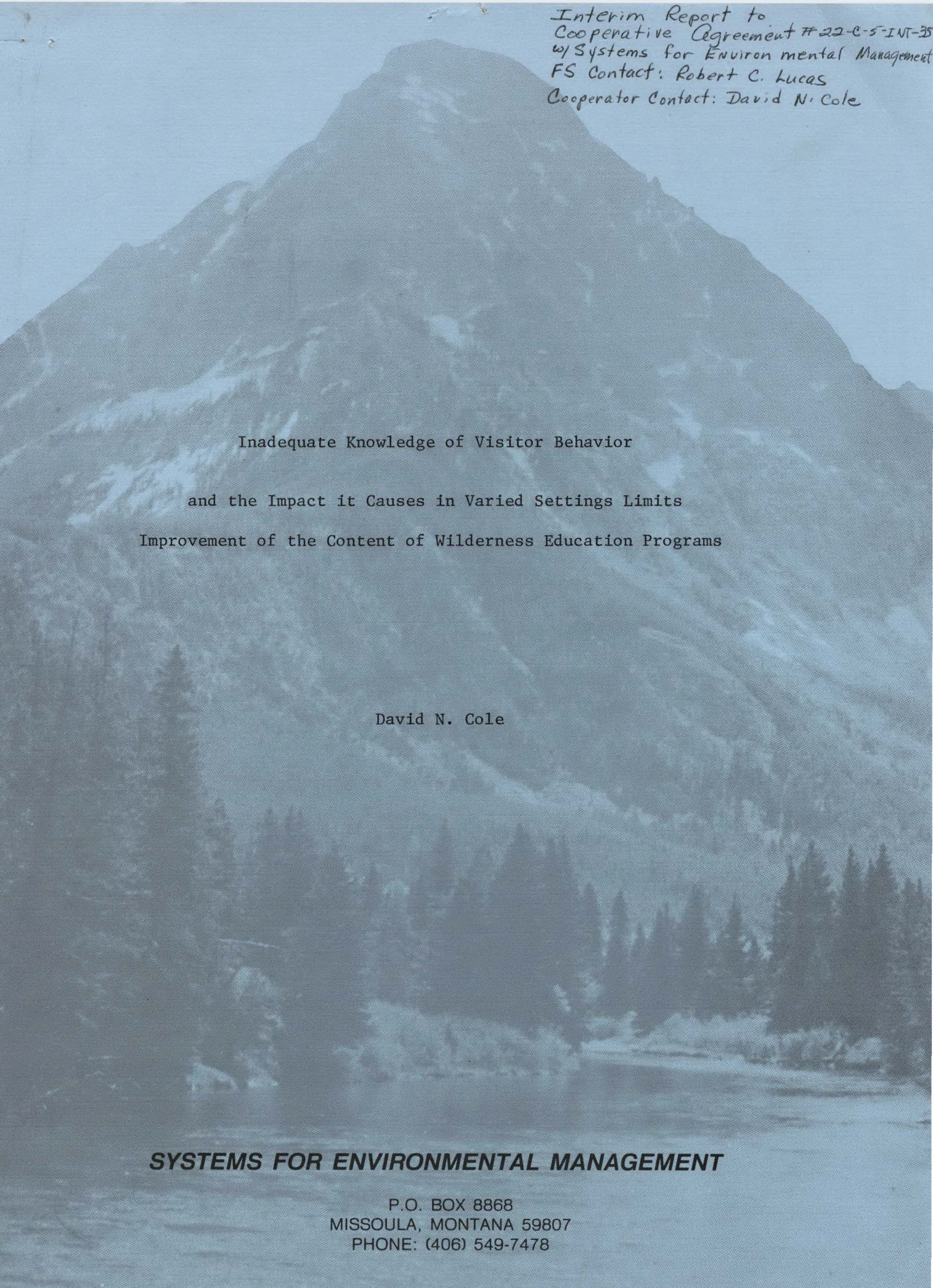


**INADEQUATE KNOWLEDGE OF VISITOR BEHAVIOR AND  
THE IMPACT IT CAUSES IN VARIED SETTINGS LIMITS  
IMPROVEMENT OF THE CONTENT OF WILDERNESS  
EDUCATION PROGRAMS**





Interim Report to  
Cooperative Agreement #22-C-5-INT-35  
w/Systems for Environmental Management  
FS Contact: Robert C. Lucas  
Cooperator Contact: David N. Cole

Inadequate Knowledge of Visitor Behavior  
and the Impact it Causes in Varied Settings Limits  
Improvement of the Content of Wilderness Education Programs

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## **SYSTEMS FOR ENVIRONMENTAL MANAGEMENT**

A Natural Resources Research Group

Systems for Environmental Management (SEM) is a non-profit research and educational corporation based in Missoula, Montana, a regional center for natural resources agencies. Founded in 1977, SEM works cooperatively and under contract with the U.S. Forest Service, National Park Service, Bureau of Land Management, and Bureau of Indian Affairs, as well as state and academic institutions, private individuals and organizations.

SEM's diverse professional staff offers a wide range of research capabilities within the natural resources management field. The full-time staff includes specialists in fire behavior, fire history, recreation management, geography, plant ecology, forestry, meteorology, data analysis, and computer science. SEM also maintains a pool of professional affiliates that can be utilized for projects requiring additional expertise. Areas of recent research emphasis include wilderness recreation management, fire history and ecology, fire planning, and development of computerized resource management tools.

PROBLEM ANALYSIS

for

RWU INT-1903

Problem No. 1

Inadequate Knowledge of Visitor Behavior  
and the Impact it Causes in Varied Settings Limits  
Improvement of the Content of Wilderness Education Programs

Prepared by:



David N. Cole, Research Scientist

Date:

6/12/85

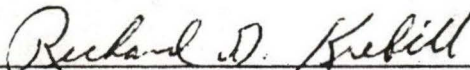
Approved by:



Robert C. Lucas, Project Leader

Date:

6/12/85



Richard G. Krebill

Date:

10/4/85

Assistant Station Director



Problem 1. Inadequate knowledge of visitor behavior and the impacts it causes in varied settings limits improvement of the content of wilderness educational programs.

### I. Problem Definition

The intent of wilderness management is to preserve natural conditions and quality experiences in wilderness. A wide variety of techniques are available to managers seeking to reach these goals. Many techniques involve strict regulation of users. While regulations can be effective, they also interfere with much of the freedom and spontaneity in wilderness recreation. Consequently, there has been a concerted effort in recent years to use education of visitors in place of regulation, where possible, to control impacts. The educational programs in place today, particularly "minimum impact" and "no trace" camping programs, represent the accumulated opinions and wisdom of those implementing the programs. There has been little objective research or evaluation of the validity of educational content.

To improve content of impact minimization educational messages we need a better understanding of how impacts are functionally related to visitor behavior. Only those impacts that vary substantially with different visitor behaviors can be managed through education. Other impacts will require different types of management. The picture is further complicated by the fact that the functional relationship between impacts and behaviors is modified by both amount of use and environment. Therefore, behavior that is appropriate in one place may be inappropriate in another. Finally, the importance of impacts, in terms of their effect on user experience, is poorly understood.

The problem at hand, then, is to improve our understanding of the relationship between visitor behavior and resulting impacts in various settings and the importance of these impacts to the visitor's experience. Then this information must be translated into educational messages tailored to different settings.

## II. Problem Components, Existing, and Needed Knowledge

Most low-impact messages deal primarily with proper choice and use of campsites, the major foci of impact in the backcountry. Campsite choice and use are also the most controversial and complex aspects of educational messages. Thus, improving low-impact camping techniques will be the main thrust of research on this problem.

This problem can be conveniently divided into three distinct components. First, we need a better understanding of the factors that influence type and amount of campsite impact in varied settings. Second, we need to take a detailed look at specific behaviors that either are or might be recommended as low-impact techniques. Third, we need an improved understanding of campsite choice behavior and visitor perceptions of campsite impacts.

Component 1. Investigate the functional relationships between campsite impacts and factors that influence amount of impact in varied settings.

Over the life of the preceding research work unit description we have made considerable progress toward understanding how impacts vary with amount of use, type of use, and environmental characteristics. Research projects were undertaken in the Eagle Cap Wilderness, Oregon, and the Bob Marshall Wilderness, Montana. Comparable studies were also undertaken in the Boundary



Waters Canoe Area, Minnesota, and Grand Canyon National Park, Arizona; another comparable study is currently being initiated in Delaware Water Gap National Recreation Area, Pennsylvania-New Jersey, and on the New River, West Virginia. Along with more limited data on campsites from several other areas, we are starting to pin down these functional relationships.

Unfortunately, the nature of these relationships varies with the type of campsite impact being studied. There is also considerable interaction between use and environmental conditions. For example, tree damage is more strongly affected by behavioral differences than is vegetation loss; vegetation loss is more strongly related to amount of use at low use levels than at high use levels; and vegetation loss at high use levels is more strongly related to amount of use in grasslands than in forests. Much of our understanding of these complexities has come from comparable studies in different environments. We need to continue examining campsite impacts in environments that have not received sufficient study. This would be almost any place other than the mountains of the northern Rockies and the Boundary Waters Canoe Area. High priorities include the forested mountains of New England and the southern Appalachians, the semi-arid Southwest, and the Southeastern United States. It would also be worthwhile expanding limited research that has been conducted in the Sierra Nevada of California and the National Parks of the Pacific Northwest.

An understanding of these relationships will help develop a perspective on the place of education in management programs. Interaction between use, behavior, and environment means that behavior that is appropriate in one situation may be inappropriate in another. Situations where this is the case should become more obvious as functional relationships are clarified. A better understanding of variation in environmental durability will also contribute to wiser campsite selection.

One important aspect of low impact camping is knowing in what situations to concentrate use on a small number of relatively highly used sites, or, in contrast, to spread use among a large number of very infrequently used sites. This decision is influenced by amount of use, type of use, user behavior, and site durability. Current experimental research is looking at how controlled differences in amount of use and environment (i.e., vegetation type) affect rates of impact and recovery. This is permitting more precise definition of where these strategies are and are not appropriate. Similar research in other environments should be encouraged. Although potentially costly, there may be cost-effective means of combining experimental research with research on existing campsites.

Component 2. Evaluate the appropriateness and effectiveness of low-impact camping techniques.

Much has been written about how to minimize impact on the land. Popular articles and how-to books describe low-impact techniques and land-managing agencies invest substantial amounts of limited resources on brochures, displays, personal contact and other means of educating users. Many of the suggestions in the educational programs are beyond debate. There is nothing controversial, for example, about encouraging people not to litter or not to cut down trees. However, some suggestions are controversial and their effectiveness has never been tested. Some of the campfire-building techniques that have been suggested may prove to cause more impact than they avoid. Or perhaps they are only effective under certain conditions. We simply do not know. Other suggested techniques may be appropriate in high use areas but not in low use areas or appropriate in resistant environments but not in fragile environments. Currently, we do not have the knowledge to advocate a set of techniques as the key to minimizing



campsite impact. Instead of rushing out and advocating a set of untested techniques, it would be prudent to test and evaluate techniques first. This would minimize the likelihood of advocating inappropriate techniques and confusing visitors by telling them one thing once and something else at a later date. It would greatly increase the cost-effectiveness and efficiency of educational programs.

To improve our base of knowledge we need to develop a compilation of all of the techniques that are being suggested in educational programs. These techniques can then be classified on the basis of their likely general appropriateness. Those for which appropriateness is questionable, at least in some circumstances, should be experimented with. This could involve either controlled experiments or evaluations conducted in places where these techniques have been tried. Through experimentation and evaluation we should be able to reject techniques that are ineffective and match techniques to the situations in which they are most effective. We should also be able to maximize the effectiveness of techniques by more completely describing how to apply each. For example, when building a campfire in a pit excavated in a meadow, we should be able to suggest actions (e.g., watering, stacking sod in the shade or using the pit for only one night) that improve survival of plants.

Component 3. Investigate campsite choice behavior, particularly visitor perceptions of campsite impacts.

Since much of low-impact education involves influencing where people camp, it is important to understand campsite choice behavior. Understanding why people camp where they do should make it easier to influence where people camp. Currently, very little is known about campsite choice. We need to study the attributes visitors key on when selecting campsites by observing the attributes



of places where people choose to camp and/or interviewing visitors about their campsite choices.

Another important research gap involves an understanding of the significance of campsite impacts from the user's point of view. Many actions taken to reduce campsite impacts entail costs, both for managers to administer and for visitors in terms of increased restriction. With an understanding of how visitors perceive impacts we would be in a better position to decide whether or not the benefits of an action--in terms of reduced impact--are worth the costs. It is important to remember that the overriding goal of wilderness management is preservation of natural conditions, regardless of how visitors perceive impacts. However, a better understanding of visitor perceptions of impact will add a poorly understood but important concern to those that should be addressed when identifying high priority problems in need of management attention.

Therefore, we need to take a close look at how visitors feel about campsite impacts. It would be particularly useful to identify visitor standards for acceptable sites. These could be used, in combination with management-derived standards for campsite condition, in setting overall standards as part of the Limits of Acceptable Change planning framework. At this point, we do not even know how variable such visitor standards might be. Evidence to date suggests that most users do not pay a great deal of attention to site impacts; and yet there are certainly many wilderness users looking for undisturbed conditions who are intolerant of even relatively low levels of impact. It would be worthwhile trying to isolate these subpopulations of users, their preferences, and their use patterns. This should help tailor management to the spectrum of users appropriate to wilderness.



### III. Proposed Studies

The following proposed studies are arranged in an approximate order of priority related to how crucial they are to addressing the problem and their cost-effectiveness. This picture is clouded by uncertainty about funding and availability of staff with the skills to conduct the research. Most of these studies could only be accomplished if funds were available for cooperative research. Studies where this is the case are noted.

Study 1. Under the preceding work unit description a study of the effects of experimental trampling on six habitat types in Montana was initiated (study INT 1903-29). These six types were trampled for three successive years. Progressive deterioration was followed over this period. Recovery on these experimental plots has now been followed for two years. Recovery should be followed closely for another year. This represents a contraction of the originally planned time frame of five years of trampling and five years of recovery. This change was forced by the need to reduce costs. The amount of information lost by shortening the study was judged to be relatively small and worth the cost savings.

This study is one of the most detailed and, even more important, the most long-term examination of the effects of carefully controlled amounts of use ever published. It is yielding interesting data that are improving our understanding of the functional relationships between amount of use, environment, and both impact and recovery. Completion of the study will require some continued support of cooperative research. At a minimum, support is needed for one more season of data collection, followed by data analysis and report writing. Total cost would be about \$8,000.



Study 2. The study with the most direct application to improving the content of educational messages would involve developing a compilation of suggested techniques and evaluating and experimenting with the most important and questionable of these techniques. The compilation is relatively simple and straightforward. However, it is hard to predict how many techniques will be controversial enough to require testing. Campfire building techniques certainly warrant examination. Some of the suggested techniques require considerable skill and appear likely to be ineffective in at least some circumstances. Experiments could be designed to evaluate the effectiveness of alternative campfire-building techniques. The effectiveness of different techniques could be evaluated, as could supporting actions such as watering or shading sod set aside after digging a pit for a fire. Field work would probably have to stretch over at least two seasons to evaluate recovery from impact.

As noted, it is not clear how much work along these lines will be needed until after analysis of the compilation of techniques. The amount of experimentation and field work required will obviously affect necessary funding. A thorough study would take many years and would be quite costly; however, many of the highest priority questions could be resolved with a less intensive effort. A program involving compilation, analysis, a modest amount of field work, and report writing would cost about \$25,000; a program involving more intensive field experimentation and evaluation would cost about \$50,000. The final product could be a handbook on low-impact techniques with details on how they should be applied and where they are and are not appropriate. This study would require skills the current staff does not possess; therefore, funds for cooperative research would be necessary.

Study 3. Investigate campsite choice behavior and the standards that different campers have regarding campsite impacts. While it is simple to



observe campsite selection and correlate selection with site attributes, it is more difficult to understand what factors visitors consider when selecting a campsite, and how site conditions affect satisfaction with the campsite. It is also simple to ask visitors what attributes are important when selecting sites; however, stated preferences often do not match observed behavior. Therefore, a combination of approaches will be required to understand why campers choose the sites they do and the extent to which site impacts influence those decisions and feelings about the appropriateness of conditions. Four approaches that can be used are: (1) interviews with sample users; (2) correlations between site attributes and conditions and observed campsite choices; (3) in-depth exploration of on-site visitor perceptions and evaluations with panels of volunteers; and (4) ratings of photographs or drawings illustrating site attributes and conditions.

A limited preliminary methodological study suggests that there is little difference in results between on-site interviews and photographic ratings. However, it is not clear whether this conclusion would apply to all of the attribute and impact parameters that need to be explored. Given the current lack of established methodology it is difficult to determine likely costs. Depending on the depth of analysis, costs would be between \$50,000 and \$100,000. Study sites should be carefully selected to be representative of as much of the National Wilderness Preservation System as possible. Heavily-used areas with a wide range of campsite locations and user types would be good choices.

Study 4. As a first step in understanding the location choice process, existing data from a 1982 visitor survey in the Bob Marshall Wilderness complex dealing with how people chose trailheads and campsites will be analyzed. These data have only been tabulated, because they did not relate to the main focus of



the study on trends. Costs would be limited, about \$6,000 for salaries, technician assistance, and computer time.

Study 5. Study the functional relationships between amount and type of use, site location, and site impacts and recovery in a previously unstudied environmental setting. Such a study would combine analysis of existing sites and experimentation, if this could be done cost-effectively. Rates of initial impact and recovery can be identified through experimentation. The importance of differences in amount and type of use and site location, in determining amount of impact, can be identified by examining a sample of existing sites, stratified according to these independent variables. Results of such a study could be used in the following ways: (1) to distinguish between situations where use should be concentrated on existing sites or dispersed among previously unused sites; (2) to identify the most serious types of impact and educational messages or other actions that can effectively minimize these impacts; (3) to identify types of impact that should be addressed in standards and included in a campsite monitoring system; (4) to identify durable campsite locations; and (5) to estimate natural recovery rates and suggest cultural means of increasing such rates.

Such a study would require funding for cooperative research. A moderately thorough study would cost about \$40,000. There are many candidate areas for such a study; the final choice will probably depend to some extent on local interest and support. The regions where results would be most widely applicable and where knowledge gaps are most pronounced are probably the southern Appalachians and the semi-arid Southwest.



## TIME SCHEDULE AND COSTS

<u>Study</u>	<u>Start</u>	<u>Complete</u>	<u>Cost</u>	<u>Scientist</u>
1. Trampling experiment*	1981	1987	\$ 8,000	Cole
2. Low-impact techniques*	1986	1989	\$25,000-50,000	Cole
3. Site attributes and visitor standards	1986	1989	\$50,000-100,000	Stankey
4. Choice location process	1985	1986	\$ 6,000	Lucas
5. Functional relationships for campsite impacts*	1986	1989	\$40,000	Cole

IV. Cooperation and Coordination

Cooperation will be primarily with David Cole, research ecologist with Systems for Environmental Management. There will also be cooperation with the North Central Station's research work unit NC-1903 (Backcountry River Recreation Management Research) and the Mid-Atlantic Region of the National Park Service who are cooperating on a study of functional relationships for campsite impacts in the Mid-Atlantic Region. There may also be some cooperation with the Pacific Northwest Station's research work unit PNW-1903 (Integrating Dispersed Recreation and Other Forest Uses) on campsite attribute research. Finally, there will be cooperation with university scientists, wilderness and backcountry managers.

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\*Studies dependent on funds for cooperative research